

What is claimed is:

1. A method, comprising:

controlling a common base or common gate mode of operation of a transistor device with

5 a servo device, the servo device providing an output to the transistor device and receiving feedback from the transistor device;

applying an approximately constant bias current to the transistor device with a current source;

receiving an input signal at an electrical node between a first terminal of the transistor

10 device and the current source; and

providing an output signal from a second terminal of the transistor device.

2. The method of claim 1, wherein the input signal is provided by a photodiode coupled to the first terminal of the transistor device.

15 3. The method of claim 2, further comprising biasing the photodiode in accordance with a voltage source coupled to the servo device.

4. The method of claim 1, wherein the output signal is provided to a laser device coupled to  
20 the collector.

5. The method of claim 1, wherein said controlling includes providing a virtual ground at the first terminal of the transistor device and further comprising providing a number of input signal pathways coupled to the first terminal of the transistor device.

5 6. The method of claim 1, wherein the servo device includes an operational amplifier with a negative input to receive the feedback, the first terminal of the transistor device corresponds to an emitter, the second terminal of the transistor device corresponds to a collector, and the transistor device further includes a third terminal corresponding to a base, said third terminal receiving the output of the servo device.

10 7. The method of claim 1, wherein the current source is of a variable type and further comprising adjusting the current source to change the approximately constant bias current from a first level to a second level.

15 8. An apparatus, comprising:

a transistor device including an emitter, a collector, and a base;

a servo device operable to provide a common base mode of operation of said transistor device;

a current source operable to provide a bias current to said transistor device for said common base mode of operation;

20 a signal source operable to provide an input signal to an electrical node positioned between said emitter and said current source; and

circuitry operable to receive an output signal from said collector.

9. The apparatus of claim 8, wherein said signal source includes a photodetector and said circuitry includes an amplifier.

5 10. The apparatus of claim 9, wherein said transistor device, said servo device, and said current source are arranged to provide a preamplifier for said input signal from said photodetector.

11. The apparatus of claim 8, wherein said servo device includes an operational amplifier  
10 having a negative input coupled to said emitter to receive negative feedback therefrom.

12. The apparatus of claim 8, wherein said circuitry includes a laser device and said signal source includes a control signal generator for said laser device.

15 13. The apparatus of claim 12, further comprising a plurality of input signal pathways coupled to said electrical node.

14. The apparatus of claim 12, further comprising a filter positioned between said current source and said electrical node.

20 15. A method, comprising:

controlling operation of a transistor device in a common base or common gate mode with a servo device;

providing negative feedback from a first terminal of the transistor device to a first input of the servo device;

providing a selected voltage level to a second input of the servo device; and

biasing a photodetector coupled to the first terminal in accordance with the selected

5 voltage level.

16. The method of claim 15, further comprising providing an output signal from a second terminal of the transistor device to an amplifier.

10 17. The method of claim 15, wherein the servo device includes an operational amplifier, the operational amplifier includes an output electrically coupled to a second terminal of the transistor device, the second terminal corresponds to a base of the transistor device, the first terminal corresponds to an emitter of the transistor device, and a third terminal of the transistor device corresponds to a collector.

15

18. The method of claim 17, further comprising:

providing a current source to bias the transistor device, the photodiode being coupled to

the first terminal by an electrical node between the current source and the first terminal; and

providing a filter between the second terminal and the output of the operational amplifier.

20

19. The method of claim 18, wherein the photodetector is of an MCT type.

20. An apparatus, comprising:

a photodetector;

a transistor device in a common base configuration operable to amplify an input signal from said photodetector, said transistor device including an emitter coupled to said photodetector to receive said input signal and a collector to provide a corresponding output signal; and

a servo device including an output arranged to maintain a voltage level at a base of said transistor device, a first input coupled to said emitter to receive negative feedback therefrom, and a second input to receive a nonzero voltage from a voltage source.

21. The apparatus of claim 20, wherein said servo device includes an operational amplifier and said photodetector is of an MCT type.

22. The apparatus of claim 20, further comprising a first filter coupled between said base and said output.

23. The apparatus of claim 22, further comprising:

a current source to bias said transistor device, said photodetector being coupled to said emitter by an electrical node between said current source and said emitter; and

a second filter coupled between said electrical node and said current source.

24. The apparatus of claim 23, wherein said current source is adjustable.

25. The apparatus of claim 20, wherein said collector provides an output signal to a first amplifier.

26. The apparatus of claim 25, further comprising an inductor coupled to said collector, said  
5 first amplifier being coupled to a first electrical node between said collector and said inductor.

27. The apparatus of claim 26, further comprising a resistor coupled in series with said inductor and a second amplifier coupled across said resistor.

10 28. A method, comprising:  
operating a transistor device in a common base or common gate configuration;  
coupling two or more input signal pathways to a first terminal of the transistor device;  
and  
providing an output from a second terminal of the transistor device to a current-  
15 dependent load.

29. The method of claim 28, further comprising providing a virtual ground at the first terminal of the transistor device.

20 30. The method of claim 28, further comprising:  
controlling the transistor device with a servo device; and  
providing feedback to the servo device from the first terminal of the transistor device.

31. The method of claim 30, wherein the servo device includes an operational amplifier having a negative input and a positive input, and further comprising:

receiving the feedback through the negative input; and

coupling the positive input to ground.

5

32. The method of claim 28, wherein the first terminal corresponds to an emitter, the second terminal corresponds to a collector and the transistor device further includes a base, and which further includes coupling a different transistor device to the base, the different transistor device including a ground-coupled emitter.

10

33. The method of claim 28, wherein the current-dependent load includes a laser device, and which further includes providing a control voltage to a first one of the input signal pathways and a sweep voltage to a second one of the input signal pathways.

15 34. The method of claim 28, wherein the current-dependent load includes a laser device, and further comprising:

supplying an approximately constant bias current to the transistor device from a first current source; and

providing electrical current to the laser device from a second current source.

20

35. An apparatus, comprising:

a transistor device including an emitter, a base, and a collector, said transistor device being in a common base configuration arranged to maintain said emitter at a predefined voltage;

a number of input signal pathways coupled to said emitter; and

a current-dependent load coupled to said collector, said current-dependent load being responsive to a signal input with one of said input signal pathways.

5 36. The apparatus of claim 35, wherein said current-dependent load includes a laser diode.

37. The apparatus of claim 35, wherein said current-dependent load includes a quantum cascade laser configuration.

10 38. The apparatus of claim 35, further comprising an operational amplifier to control said transistor device, said operational amplifier including a negative input coupled to receive feedback from said emitter, a positive input coupled to ground, and an output configured to drive said base.

15 39. The apparatus of claim 35, further comprising a different transistor device coupled to said base, said different transistor device including an emitter coupled to ground.

40. The apparatus of claim 35, further comprising a control signal generator coupled to one of said inputs.

20

41. The apparatus of claim 35, further comprising a first current source and a second current source, said input signal pathways being coupled to a first electrical node positioned between



said emitter and said first current source, and said collector being coupled to a second electrical node positioned between said second current source and said current-dependent load.

42. A method, comprising:

operating a transistor device in a common base or common gate configuration to provide a virtual ground at a first terminal of the transistor device;

electrically coupling a laser device to a second terminal of the transistor device; and

controlling operation of the laser device with an input signal provided to the first terminal of the transistor device.

43. The method of claim 42, which further includes providing a number of input signal pathways coupled to the first terminal of the transistor device.

44. The method of claim 42, wherein said operating including controlling operation of the transistor device with a servo device, the servo device receiving feedback from the first terminal.

45. The method of claim 42, further comprising:

supplying an approximately constant bias current to the transistor device from a first current source; and

providing electrical current to the laser device from a second current source.

46. The method of claim 42, wherein said operating includes regulating operation of the transistor device with a different transistor device having an emitter coupled to ground, the transistor device and the different transistor device having a base connection in common.